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ABSTRACT

This paper focuses on the responsiveness of libraries to user needs within the context of a changing academic environment. First, the character of the changes in the academic environment and the consequences of them for the relationship between scientific information and users are elaborated. Then, the kinds of responses needed for the adequate support of scientific practices by academic libraries are discussed and illustrated with some experiences from the University Library Twente as follows: responding to changing relationships between scientific information and users; offering remote access; estimating user needs; and supporting users in new contexts. Statements for discussion are presented: (1) in the changing scientific environment, the traditional academic freedom can be restricted by market forces and enlarged by ICT-developments; (2) although users of scientific information become technically increasingly independent of intermediaries, for reasons of efficiency they need new facilities and forms of support offered by, for example, academic libraries; (3) academic libraries are not meant to pull developments in scientific processes--they are expected to develop innovative facilities and forms of support to facilitate the scientific process; (4) adjustments of the supportive role of academic libraries can better be pushed by user needs than by technology; (5) responsiveness to user needs requires continuous observation and monitoring of the information behavior of users--research on, development of and experiments with advanced techniques for doing so are desperately needed; and (6) library staff in academic libraries needs not only professional information skills but also didactic and research skills in order to facilitate and support future scientific processes adequately. (AEF)

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THE FUTURE OF ACADEMIC LIBRARIES AND CHANGING USER NEEDS: GENERAL CONCEPTS AND CONCRETE DEVELOPMENTS

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Introduction

Academic libraries operate within changing academic environments. Academic environments change partly as a consequence of developments in information and communication and partly because of developments in the practice of science. These developments are pushed by societal and technological factors, for instance the increasing influence of market mechanisms and the evolution of information and communication technology (ICT).

The need for change in academic libraries often seems to be pushed more by ICT-developments than by user needs in the context of changing academic circumstances. Academic libraries have to function primarily as service oriented, stimulating institutes supporting academic processes. They are not expected to push changes in the academic environment. Therefore one should expect changing user needs to be a main factor in the development of academic libraries.

This paper concentrates on the responsiveness of libraries to user needs within the context of a changing academic environment. First the character of the changes in the academic environment and the consequences of them for the relation between scientific information and users will be elaborated. Then the kinds of responses needed for the adequate support of scientific practices by academic libraries are discussed and illustrated with some experiences in the University Library Twente. Finally some concluding statements for discussion are presented.

The changing academic environment

In this paper the concept of academic environment is identical to the university and used for those scientific arenas which are characterized by the combination, and often interrelation, of scientific research and scientific education. Changes in the academic environment are affected by the development of science in general.

Changes in science

The development of science has been analysed by many scholars, for example recently by Ziman (1994) [10] and Gibbons et al. (1994) [2]. These authors notice a change in science due to internal dynamics like the steady growth of knowledge production, increasing interdisciplinarity, increasing attention for applied sciences, networking and internationalisation. These changes have been verified and roughly confirmed by means of bibliometric analysis (Hicks and Katz, 1996) [4]. However, the work of Gibbons et al. [2], about a new mode of knowledge production, has been critisized by Godin (1998) [3]. He presents evidence for a lack of empirical validation of the supposed new mode of knowledge production.

Nevertheless, there seems to be consensus about the phenomenon of a growing heterogeneity in actors involved in science. Rip argues that in many sciences there is a trend of broadening the scientific audience across the traditional boundaries of disciplines and academic environment, for example by bureaus,

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consultancies and policy-makers (1995:85) [8].

Furthermore most authors witness a development in science characterized by a shift to so-called strategic research. Roosendaal and Geurts notice a shift to strategic research characterized by more selectivity along societal priorities and strict research plans and programmes. Driving force is the scarcity in research resources demanding "research breakthroughs within an acceptable time horizon" (1998:5) [9]. According to the authors of this paper, this might lead to a priority for short-term research and an underestimation of 'curiosity' as an important driving force in scientific advancement. Ziman argues that strategic research combines short-term research purposes with "a more general strategy of undertaking more basic research with wider, longer-term goals" (1994:31) [10]. According to Godin this does not mean that strategic research programmes are always socially accountable (1998:478) [3].

Changes in academic research and education

Universities are unique because they are scientific institutions where research is combined with education. Academic education is considered to be part of the advancement of knowledge. Therefore the academic environment needs a norm of openness with respect to research results while other scientific institutions are generally more prudent in communicating outcomes of their scientific work (Ziman 1994:39-40) [10]. Boyer (1990) [1] distinguishes four key roles of the university: scholarship of teaching, scholarship of discovery, scholarship of application and scholarship of integration of scientific knowledge. Johnston (1998:269) [5] maintains that all these scholarships are the core business of universities, although emphasis shifts as appropriate to meet the needs of the times. One should be aware of the relation between these roles in order to guarantee both flexibility and continuity of the university. Science and, more specific, academic research changes within a context of societal and technological developments. Government policies with respect to science funding, for example, forces universities to collaborate with other institutions, which stimulates heterogeneity in actors involved in science. Reduced public funding for scientific and/or academic research makes universities more dependent of resources from and collaboration with market-oriented parties. At the same time increasing collaboration and heterogeneity is facilitated by advanced information and communication technology. Like in academic research, in academic education changes can be witnessed because of societal and technological developments. Labour market developments nowadays demand core competences, lifelong learning, et cetera, while reduced public resources for higher education creates a need for efficiency and, consequently, a strict organization, control and monitoring of academic education processes. At the same time ICT offers good prospects for new modalities of realising education, thus enabling learning instead of teaching. Scientific communication and user needs Line (1996) [7] indicates that boundaries between actors involved with using, producing, publishing and distributing information become fluid because of changes in academic research and education. Consequently, academic libraries as actors in the process of scientific communication, are confronted with an increased capacity of the private sector to work in the same field. Individuals are able to bypass traditional actors like libraries and publishers. Thus new checks and balances develop in processes of scientific communication.

University libraries have an important supportive role in both, educational and research processes. Kuhlthau (1993) [6] for example argues that this role not only consists of providing just in time access and delivery of information, but also of facilitating problem solving. Kuhlthau sees searching information as "a process of construction from uncertainty to understanding". In this process she distinguishes cognitive, affective and operational aspects and concepts which should be taken into account when providing information services. So far there seems not to be very much research dealing with these psychological aspects of users' information processes. Nevertheless in the development of modern tools for supporting users increasing attention for 'user, psychological aspects' can be recognised.

Academic libraries have to provide information services for users acting in an academic environment which is characterized by increasing collaboration and heterogeneity of scientific actors. To get a more

detailed picture of actual and future user needs, research has to be carried out on the process of scientific communication in the context of academic research and education. As an essential part of this kind of research special attention has to be paid to different aspects of user behaviour and user needs regarding information, including psychological aspects.

The University Library Twente has the intention to initiate a research programme on scientific communication. At the moment the University Library Twente is carrying out different types of projects on user needs concerning information. Some experiences will be described in the following section.

Responding to changing relationships between scientific information and users
Traditionally researchers have a rather 'indirect' relationship with scientific information. As producers and users of information they used to need the assistance of intermediaries in the form of publishers, libraries etc. Nowadays their relationship with scientific information changes into a more 'direct' one due to especially developments in ICT. As producers and users of scientific information researchers can operate more independent from intermediaries although intermediaries can still be of value in facilitating scientific communication.

Students traditionally have a 'direct' relationship with teachers as leaders of learning processes in more or less linear organised instructional environments. Due to societal and technological developments traditional teaching changes increasingly in creating (tele)learning environments. Students participate in flexible learning processes via more 'indirect' contacts with teachers and facilities, including scientific information. Teachers no longer lead instruction, they facilitate learning.

These changes require new challenging roles and skills not only for students, teachers and researchers but also for others facilitating scientific learning and research like academic libraries.

The challenges for academic libraries are threefold: a. offering user-friendly ICT-oriented facilities (like remote access to information and services), b. estimating changing user needs and c. supporting users in new academic environments. These items affect all users of scientific information. For example researchers in coping with topics like copyright, teachers in organising new (ICT-oriented) learning environments and students in getting more responsibility for their own learning processes including the development of adequate information skills. The topics mentioned above will be elaborated, referring to projects of the University Library Twente.

Offering remote access to a variety of information, not only in libraries but also worldwide via databases, homepages with selected Internetsites and the like, attracts much attention from librarians. Most of this attention is still technology driven. Many of such new facilities are less used than expected and/or hoped for. This can for example be illustrated with experiences with the 'profile-form' (see later). Reasons for this situation have to be sought in the direction of too little attention for user friendliness from the perspective of the users of information, too little attention for the responsiveness of facilities to user needs and inadequate public relations and marketing. This topic will not further be elaborated here as the main interest is not in ICT but in user needs.

Estimating user needs deserves more attention than it often gets. Too often statements on user needs are based on suppositions of providers of information services instead of on empirical information. Much more observation, monitoring and research is needed regarding the behaviour and needs of users of information. Therefore some initiatives on getting to know more about user needs are tried out in the University Library Twente.

Two projects on *registering users' questions* are realised. The questions raised are registered by members of the library staff. Such registrations are only indicative as, due to daily work stress, probably not all

questions were noted down and mistakes were easily made. Furthermore it was a new experience for staff members to register questions. Nevertheless both registrations of questions resulted in useful indications.

The first one, lasting three months and held in 1996, aimed at getting insight in the character of users' questions and at knowing how adequate questions of users are dealt with in the University Library Twente. About 40 per cent of the questions appeared to have a general character and are expected to be solved by means of PR-leaflets and signposting. About 90 per cent of all questions could be overcome adequately without reference to a colleague staff member.

The second registration of questions is realised in 1998 and lasted also three months. This time the aim was to register users' questions about specific products and services of the library. It served as a preliminary investigation to a more thorough research on user needs. The following conclusions should be regarded as very indicative. Users noticed some user unfriendly facilities in the Online Library and Information System and some technical imperfections when using CD-rom's in the universities' network. Regarding library services users want more and cheaper lending facilities, less complicated shelving numbers, longer opening hours, and more study rooms and computers.

For the Faculty of Educational Technology of the University of Twente a *self-diagnostic 'profile form'* has been developed in which users express the state of the art of their information skills as well as their information needs. The profile-form is a questionnaire consisting of four categories of key-questions dealing with what respondents know, what they think they are able to do, what they actually do and what they wish (see box 1). The questions are closely interrelated and each answer has a score. After filling in the form, the user can immediately get a total score indicating his or her level of information skills. The outcomes can also be presented graphically. Based on the total score the user and, when involved, also the information specialist, knows whether support on information skills is needed. Based on the score per category of questions it is possible to support only on those aspects which require attention. Putting together scores of groups of users provides a basis for developing services fitting with user needs. So this self-diagnostic tool can be used individually as well as for groups of users and gives insight in information skills as well as in information needs.

BOX 1: The self-diagnostic 'profile form'
(In this example only one question per category is shown)

(question)	(score)	(answer)
Did you know...	1	no, never done
... it is possible to realise a personal SDI?	2	I think so
	3	yes, practised
Do you have ...	1	yes
... a SDI in international databases?	2	no
Do you wish ...	0	is already realised
... to be alerted on new publications of your interest?	0	no need for
	0	yes, please

Recently some *focusgroup discussions* were organised with students, teachers and information specialists of the University of Twente. The topic was: What is needed to stimulate and support the use of scientific information in academic learning processes? The outcomes show unanimously that the response to user

needs is not optimal with the current (organisation of) provisions and learning processes as far as coping with scientific information is concerned. Three main areas of dissatisfaction can be distinguished: lack of up to date information skills, lack of integration of training and assessment of information skills throughout the curriculum, and lack of (knowledge of) facilities, sources etc. Such outcomes require innovative activities of both the academic library and the departments of the university concerning for example:

- the development of self-instructional materials to be used just in time for updating information skills,
- the adjustment of the organisation of the curriculum and support for teachers, and
- the enhancement of lively demonstrations.

Supporting users in new contexts requires more conceptual and psychological thinking than libraries are used to do (see for example Kuhlthau). This is very obviously the case with some self-instructional materials developed by the University Library Twente in cooperation with the Faculty of Educational Technology. These self-instructional materials are based on minimalistic principles, thus offering very condensed and user-friendly instruction in using databases. Within about 15 minutes the user is equiped properly to use the sources concerned efficiently.

Another form of supporting users in new contexts is the MEEWIZ-programme. In English it is called SESSION: Systematic and Efficient Searching of Scientific InformatiON. It is a *training programme* for the development of information skills. The programme can be used as self-instruction, but also for remote or tele-learning embedded in a discipline-oriented curriculum. It is offered via the web and consists of five modules (1: problem statement, 2: referring sources, 3: search techniques, 4: informative sources, 5: information management). Each module contains interactive instruction, exercises, illustrative examples, links if opportune, syllabus texts and possibilities for coping with ones' own topic as much as possible. The modules can be followed either seperately or as a complete course. The programme has an administrative system providing opportunities for monitoring the learning process and for getting ones' own answers back when restarting the programme.

BOX 2: Overview of self-instructing training programme SESSION
(The numbers refer to the numbers of the modules in the programme)

phases in the search process	**techniques**
formulating the problem and orienting on it	formulating the problem (1) orientation (2 and 4)
developing and planning the search strategy	selecting: referring sources (2) terms (3) organising the search process (5)
realising the systematic search and managing the results	searching referring sources (3) information management (5) kinds of informative sources (4)
evaluating the search process and its results	evaluating sources (5)

The projects of the University Library Twente presented in this paper enhance responsiveness to changes in

sceintific communication. However, they should be regarded as start. In general university libraries have to develop knowledge on changes in scientific processes and communication on a longer term in order to safeguard or strengthen their position within the academic world.

By way of conclusion: statements for discussion

1. In the changing scientific environment the traditional academic freedom can be restricted by market forces and enlarged by ICT-developments.

2. Although users of scientific information become technically increasingly independent of intermediaries, for reasons of efficiency they need new facilities and forms of support offered by, for example, academic libraries.

3. Academic libraries are not meant to pull developments in scientific processes. They are expected to develop innovative facilities and forms of support to facilitate the scientific process.

4. Adjustments of the supportive role of academic libraries can better be pushed by user needs than by technology (although academic libraries should take as much advantage of ICT-developments as possible).

5. Responsiveness to user needs requires continuous observation and monitoring of the information behaviour of users. Research on, development of and experiments with advanced techniques for doing so are desperately needed.

6. Library staff in academic libraries needs not only professional information skills but also didactic and research skills in order to facilitate and support future scientific processes adequately.

By the way, the authors of this paper experience their own behaviour as inconsistent when alternating their role of information service provider and information service user.

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